Bachelor of Computer Applications

Proposed Scheme of Syllabus

(CHOICE BASED CREDIT SYSTEM)

W.E.F ACADEMIC SESSION 2021-22

BACHELOR OF COMPUTER APPLICATIONS
(BCA) DEGREE

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
SECTOR-16C, DWARKA, NEW DELHI-110078

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I. BACHELOR OF COMPUTER APPLICATIONS PROGRAMME DETAILS

1. Aim:

The programme covers rudimentary to advance concepts in Computer Science and its applications in various domains. An exceptionally broad range of topics covering current trends and technologies in the field of information technology and computer science are included in the syllabus. The hands on sessions in Computer labs using various Programming languages and tools are also given to have a deep conceptual understanding of the topics to widen the horizon of students' self- experience.

Students, who choose BCA Programme, develop the ability to think critically, logically, analytically and to use and apply current technical concepts and practices in the core development of solutions in the multiple domains.

The knowledge and skills gained with a degree in Computer Application prepare graduates for a wide range of jobs in education, research, government sector, business sector and industry. In broader perspective the mission of teaching BCA is to produce employable IT workforce, that will have sound knowledge of IT and business fundamentals that can be applied to develop and customize solutions for various Enterprises.

2. Programme Objectives:

It is envisioned that the graduates passing out BCA degree, will achieve the following objectives and will be able to

Programme Objectives (POs)	Description
PO1	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5	Understand the front end and backend of software applications.
PO6	Gain expertise in at least one emerging technology.
PO7	Acquire knowledge about computer architecture and organization, networks, network devices and their configuration, protocols, security concepts at various level etc.

PO8	Apply techniques of software validation and reliability analysis to the development of computer programs.
PO9	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO10	Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in providing the solutions.
PO11	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.

3. Programme Learning Outcomes:

The completion of the BCA Programme shall enable a student to:

i) To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis

ii) Identify applications of Computer Science in other fields in the real world to enhance the career prospects

iii) Realize the requirement of lifelong learning through continued education and research.

iv) Use the concepts of best practices and standards to develop user interactive and abstract application

v) Understand the professional, ethical, legal, security, social issues and responsibilities.

The detailed list of programme learning outcomes is as follows:

PLO	Attribute	Description
PLO1	Communication Skills	The student should be able to communicate the technical information both orally and in writing professionally.
PLO2	Use of Software Tools	Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PLO3	Technical Skills	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PLO4	Domain Awareness	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PLO5	Technical Support	Must be able to provide technical support for various software applications.
PLO6	Analysis and	Ability to analyze research and investigate complex computing

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	investigation of Complex Computing Problems	problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PLO7	Design / Development of Solutions	Apply the knowledge gained in core courses to a broad range of advanced topics in computer science, to learn and develop sophisticated technical products independently.
PLO8	Imbibe Cyber Ethics	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

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II. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.

1. Types of courses in CHOICE BASED CREDIT SYSTEM (CBCS)

1.1 Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

1.2 Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

a) **Discipline Specific Elective (DSE) Course:** Elective courses offered by the main discipline/subject of study are referred as Discipline Specific Electives.

b) **Project work/Dissertation** is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A candidate studies such a course on his own with an advisory support by a teacher/faculty member. The work done will have to be submitted in writing as a project report / dissertation.

c) **Generic Elective (GE) Course:** Elective courses that are generic or interdisciplinary by nature chosen from an unrelated discipline/ subject with an intention to seek exposure beyond discipline/s of choice are called Generic Electives. Students will have to choose one elective each in the third and fourth semester from the lists GE1 to GE2 given in this syllabus.

1.3 Ability Enhancement Courses (AEC)

The Ability Enhancement (AE) Courses are the course that lead to Knowledge enhancement. These are of two types.

a) **AE Compulsory Course (AECC):** Environmental Studies, English Communication/MIL Communication.

b) **AE Elective Course (AEEC):** AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

III PROGRAMME STRUCTURE:

The BCA programme is a three-year course of 160 credits divided into six-semesters. A student is required to complete 150 credits for the completion of course and the award of degree.

	Academic Year	Odd Semester	Credits	Even Semester	Credits
Part – I	First Year	Semester I	26	Semester II	26
Part – II	Second Year	Semester III	27	Semester IV	27
Part – III	Third Year	Semester V	27	Semester VI	27

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Total Credits – 162	80		82

Eligibility Criteria: The detailed eligibility criteria for BCA programme for an academic session will be provided in the admission brochure. However, for quick reference, the eligibility criteria of BCA programme for academic session 2021-22 is as follows:
"Pass in 12th Class of 10+2 of CBSE or equivalent with a minimum of 50% marks in aggregate* with pass in English (core or elective or functional). Mathematics or (Computer Science / Informatics Practice / Computer Applications / Multimedia & Web Technology / Data Management Application / Web Application as compulsory subject of non-vocational stream with 50 theory and 50 practical ratio). OR Three year Diploma in a branch of Engineering from a polytechnic duly approved by All India Council for Technical Education and affiliated to a recognized examining body with a minimum of 50% marks in aggregate."

Admission Criteria: Admission shall be based on the merit of the written test /CET.

IV INSTRUCTION FOR QUESTIONS PAPER SETTER:

a) Question Paper setter for each course must refer the instructions provided with the detailed syllabus of the specific courses.
b) The question paper shall be preferably set from the prescribed text books and reference books, mentioned in the syllabus.

V CREDIT ALLOCATION (BCA PROGRAMME OF STUDY)

Course	**Credits**	
	Theory + Practical	**Theory + Tutorial**
	Core Course (6 credits) (12 papers)	**Core Course (4 credits) (7 papers)**
Core Course Theory 19 Papers	12x4=48	7x3=21
Core Course Practical / Tutorial* 19 Papers	12x2=24	7x1=7
Elective Course (4 Papers of 5 credits each, 5 Papers of 4 credits each and 7 Papers of 2 credits each)		
A.1. Discipline Specific Elective (4 Papers)	4x4 = 16	
A.2. Discipline Specific Elective Practical/Tutorial* (4 Papers)	1×4 = 04	
B.1. Generic Elective/ Interdisciplinary (2 Papers)		2x3 = 06
B.2. Generic Elective Practical/ Tutorial* (2 Papers)		2x1 = 02

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1.Ability Enhancement Compulsory Courses(AECC) (3 Papers of 4 credit each and 1 Paper of 6 Credit including Minor & Major Project)	1x4 + 1x6= 10	2x4=8
2. Ability Enhancement Compulsory Courses(AECC) (2 Papers of 2 credit)		2x2 = 04
Skill Enhancement Courses (SEC) (5 Papers of 2 credit each)	5x2 = 10	
Co-Curricular Activities	2	
Total credit 162	**114**	**48**

*Wherever there is practical, there will be no tutorial and vice-versa

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III. CBCS COURSE STRUCTURE FOR BCA PROGRAMME

1. SEMESTER WISE PLACEMENT OF THE COURSES

Semester	CORE COURSE (18)	Ability Enhancement Compulsory Course (AECC) (3)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific (DSE) (5)	Elective: Generic (GE) (2)
I **Total Credits 26**	CC1 (4) Discrete Mathematics	AECC 1 (4) Technical Communication			
	CC2 (4+2) Programming using 'C' Language				
	CC3(4+2) Fundamentals of IT & Computers				
	CC4 (4+2) Web Technologies				
II **Total Credits 26**	CC5 (4) Applied Mathematics	AECC2 (2) Environment Studies	SEC -1 (2)		
	CC6 (4+2) Web Based Programming				
	CC7 (4+2) Data Structure And Algorithm Using 'C'				
	CC8 108 (4+2) Database Management System				
III **Total Credits 27**	CC9 (4) Computer Network	AECC3 (2) Human Values and ethics	SEC -2 (2)	DSE- 1 (4+1)	Any course from the list GE-1(4)
	CC10 (4) Computer Organization and Architecture				
	CC11 (4+2) Object Oriented Programming with C++				
IV **Total Credits 27**	CC12(4+2) Java Programming	AECC4 (4) Introduction to Management & Entrepreneurship Development	SEC-3 (2) Personality Development Skills	DSE -2 (4+1)	Any course from the list GE-2 (4)
	CC13 (4+2) Software Engineering				
V **Total Credits**	CC14 (4+2) Operating System & Linux Programming	AECC 5 Minor Project (4)	SEC-4 (2) Summer Internship	DSE -3 (4+1)	
	CC15(4+2) Computer Graphics				

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27	CC 16 (4) Cloud computing				
VI **Total Credits 29**	CC17 (4) Datawarehousing and Data Mining	AECC 6 Major Project (6)	SEC-5 (2) Seminar/ Conference Presentation	DSE -4 (4+1)	
	CC18 (4) E-Commerce				
	CC19 (4+2) Internet of Things				
	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory (2)			

1.1 Skill Enhancement Course 1(SEC)
SEC 1 (choose one) Skill development course from the following

(i) MOOC course from SWAYAM / NPTEL of minimum 2 credits. Certificate is Mandatory for the degree
(ii) Front End Design Tool VB.Net Lab
(iii) Statistical Analysis using Excel
(iv) Designing Lab Photoshop

SEC 2 (choose one)

(i) MOOC course From Swayam / NPTEL of minimum 2 credits. Certificate is Mandatory for the degree
(ii) Designing Lab CorelDraw
(iii) ASP.Net
(iv) AR/VR

1.2 Discipline Specific Electives (DSE) (Choose any One Group of DSE)

DSE-A – Data Science & Analytics

1. Basics of Python Programming
2. Introduction to Data Science
3. Data Visualization & Analytics
4. Machine Learning with Python

DSE-B – Artificial Intelligence & Machine Learning

1. Basics of Python Programming
2. Introduction to Artificial Intelligence
3. Machine Learning with Python
4. Deep Learning with Python

DSE-C– Cyber Security

1. Cyber Security
2. Network Security
3. Web Security
4. IT Acts and Cyber Laws

DSE-D – Software Development

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1. Basics of Python Programming
2. Web Development with Python
3. Web Development with Java & JSP
4. Mobile Application Development

1.3Generic Elective (GE) for BCA Students

GE 1 (choose any One)

(i) Principles of Management & Organizational Behaviour
(ii) Any One Paper Offered as open elective by other School /Department / Programme

GE 2 (choose any One)

(i) Digital Marketing
(ii) Principles of Accounting
(iii) Any One Paper Offered as open elective by other School / Department / Programme

1.4Generic (Open) Electives for other undergraduate programmes

The following Core courses of BCA programme may be offered as Generic Elective for other undergraduate programmes. Maximum number of students from other School / Department / Programme should not exceed 20% of total intake for the programme.

S.No.	Semester	Subject Code	Subject Name
1	I	BCA 105 BCA 173	Fundamentals of Computers & IT Practical – II IT Lab
2	I	BCA 107 BCA 175	Web Technologies Practical-III Web Tech Lab
3	II	BCA 108 BCA 176	Database Management System Practical – VI DBMS Lab
4	III	BCA 205 BCA 271	Object Oriented Programming using C++ Practical – VI C++ Lab
5	III	BCA 211	Basics of Python Programming
6	VI	BCA 304	E-Commerce

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SEMESTER WISE EVALUATION SCHEME

Based on the above-mentioned course categories the semester wise Evaluation scheme of BCA Programme will be as follows:

FIRST SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory								
BCA 101	Discrete Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 103	Programming Using 'C' Language	Core Course Theory	3	1	4	25	75	100
BCA 105#	Fundamentals of Computers & IT	Core Course Theory	3	1	4	25	75	100
BCA 107#	Web Technologies	Core Course Theory	3	1	4	25	75	100
Ability Enhancement Compulsory Course (AECC)								
BCA 109	Technical Communication	AECC	3	1	4	25	75	100
Core Course Practicals								
BCA 171	Practical – I 'C' Prog. Lab	Core Course Practical	0	4	2	40	60	100
BCA 173#	Practical – II IT Lab	Core Course Practical	0	4	2	40	60	100
BCA 175#	Practical-III Web Tech Lab	Core Course Practical	0	4	2	40	60	100
Bridge Course (Mandatory for Students from Non Mathematics background)								
BCA 181^{+}	Bridge Course in Mathematics	Mandatory for Students from Non Mathematics background	2	0	0	Pass Grade	------	------
	Total Credits				**26**			**800**

$^{+}$ Non Credit subject mandatory for the students who do not have mathematics in 12th std. The student has to obtain at least pass marks (40). The examination of this paper shall be conducted by the concerned teacher teaching the course / paper as Teacher's Continuous Evaluation for total 100 marks. Only the Pass / Fail status is to be specified on the marksheet of the examination and the result of the student. Passing is mandatory for student not having mathematics in 12th std.

 # Generic Elective (GE) for other undergraduate programmes

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

SECOND SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory								
BCA 102	Applied Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 104	Web based Programming	Core Course Theory	3	1	4	25	75	100
BCA 106	Data Structure And Algorithm Using 'C'	Core Course Theory	3	1	4	25	75	100
BCA 108#	Database Management System	Core Course Theory	3	1	4	25	75	100
Ability Enhancement Compulsory Course (AECC)								
BCA 110	Environment Studies	AECC	2	0	2	25	75	100
***Skill Enhancement Course (AEEC) (Choose any One)**								
BCA 132	**MOOC course from SWAYAM / NPTEL	SEC-1	0	0	2	100	0	100
BCA 134	Front End Design Tool VB.Net Lab	SEC-1	0	4	2	100	0	100
BCA 136	Statistical Analysis using Excel	SEC-1	0	4	2	100	0	100
BCA 138	Designing Lab Photoshop	SEC-1	0	4	2	100	0	100
Core Course Practical								
BCA 172	Practical-IV WBP Lab	Core Course Practical	0	4	2	40	60	100
BCA 174	Practical – V DS Lab	Core Course Practical	0	4	2	40	60	100
BCA 176#	Practical – VI DBMS Lab	Core Course Practical	0	4	2	40	60	100
	Total				**26**			**900**

***NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute)**

 # Generic Elective (GE) for other undergraduate programmes

TOTAL MARKS: 900

**Instructions for MOOC course

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.

3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.

4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and a result declared for these papers. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

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SEMESTER WISE EVALUATION SCHEME

THIRD SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 201	Computer Network	Core Course Theory	3	1	4	25	75	0	100
BCA 203	Computer Organization and Architecture	Core Course Theory	3	1	4	25	75	0	100
BCA 205#	Object Oriented Programming with C++	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 207	Human Values and Ethics	AECC	2	0	2	25	75	0	100
***Discipline Specific Elective (Choose any One)**									
BCA 211#	Basics of Python Programming	DSE-1	4	1	5	25	50	25	100
BCA 213	Cyber Security	DSE-1	4	1	5	25	50	25	100
****Generic Elective (Choose any One)**									
BCA 221	Principles of Management & Organizational Behaviour	GE-1	3	1	4	25	75	0	100
BCA 223	Open Elective offered by other Department/School /programme	GE-1	3	1	4	25	75	0	100
*****Skill Enhancement Course (AEEC) (Choose any One)**									
BCA 231	****MOOC course from SWAYAM / NPTEL	SEC-2	0	0	2	100	0	0	100
BCA 233	Designing Lab CorelDraw	SEC-2	0	4	2	100	0	0	100
BCA 235	ASP.Net	SEC-2	0	4	2	100	0	0	100
BCA 237	AR/VR	SEC-2	0	4	2	100	0	0	100
BCA	Cyber Ethics	SEC-2	2	0	2	100	0	0	100

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239									
Core Course Practical									
BCA 271#	Practical – VII C++ Lab #	Core Course Practical	0	4	2	40	0	60	100
	Total				**27**				**800**

 # Generic Elective (GE) for other undergraduate programmes
*** First Subject from Discipline specific chosen group**
**** Choose one subject from list of GE-1**
***** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment**

****Instructions for MOOC course

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and a result declared for these papers. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

FOURTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 202	Java Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 204	Software Engineering	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 206	Introduction to Management & Entrepreneurship Development	AECC	3	1	4	25	75	0	100
***Discipline Specific Elective (Choose any One)**									
BCA 212	Introduction to Data Science	DSE-2	4	1	5	25	50	25	100
BCA 214	Introduction to Artificial Intelligence	DSE-2	4	1	5	25	50	25	100
BCA 216	Network Security	DSE-2	4	1	5	25	50	25	100
BCA 218	Web Development Using Python and Django	DSE-2	4	1	5	25	50	25	100
****Generic Elective (Choose any One)**									
BCA 222	Digital Marketing	GE-2	3	1	4	25	75	0	100
BCA 224	Principles of Accounting	GE-2	3	1	4	25	75	0	100
BCA 226	Open Elective offered by other Department/ School /programme	GE-2	3	1	4	25	75	0	100
***Skill Enhancement Course (AEEC)**									
BCA 232	Personality Development Skills	SEC-3	2	0	2	100	0	0	100
Core Course Practical									
BCA 272	Practical –VIII Java Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 274	Practical – IX SE Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				**27**				**800**

* **Second Subject from Discipline specific chosen group**

** **Choose one subject from list of GE-2**

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***** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment**

Summer Training will be held for 4 weeks after the end of fourth semester. Viva-Voce will be conducted in fifth semester.

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

FIFTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 301	Operating System & Linux Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 303	Computer Graphics	Core Course Theory	3	1	4	25	75	0	100
BCA 305	Cloud Computing	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 307	Minor Project	AECC	0	8	4	40	0	60	100
***Discipline Specific Elective (Choose any One)**									
BCA 311	Data Visualization & Analytics	DSE-3	4	1	5	25	50	25	100
BCA 313	Machine Learning with Python	DSE-3	4	1	5	25	50	25	100
BCA 315	Web Security	DSE-3	4	1	5	25	50	25	100
BCA 317	Web Development with Java & JSP	DSE-3	4	1	5	25	50	25	100
***Skill Enhancement Course (AEEC)**									
BCA 331	Summer Training Project	SEC-4	0	0	2	100	0	0	100
Core Course Practical									
BCA 371	Practical – X Linux - OS Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 373	Practical – XI CG Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				**27**				**800**

*** Third Subject from Discipline specific chosen group**

*****NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment. Evaluation will be based on Summer Training held after fourth semester.**

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

SIXTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 302	Data Ware Housing & Data Mining	Core Course Theory	3	1	4	25	75	0	100
BCA 304#	E- Commerce	Core Course Theory	3	1	4	25	75	0	100
BCA 306	Internet of Things	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 308	**Major Project	AECC	----	12	6	40	0	60	100
***Discipline Specific Elective (Choose any One)**									
BCA 312	Machine Learning with Python	DSE-4	4	1	5	25	50	25	100
BCA 314	Deep Learning with Python	DSE-4	4	1	5	25	50	25	100
BCA 316	IT Act and Cyber Laws	DSE-4	4	1	5	25	75		100
BCA 318	Mobile Application Development	DSE-4	4	1	5	25	50	25	100
***Skill Enhancement Course (AEEC)**									
BCA 332	Seminar/ Conference Presentation	SEC – 5	0	0	2	100	0	0	100
Core Course Practical									
BCA 372	Practical – XII IOT Lab	Core Course Practical	0	4	2	40	0	60	100
$ BCA 374	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory	0	0	2	100	0	0	100
	Total				**29**				**800**

***Fourth Subject from Discipline specific chosen group.**

****The student shall do the Major project in the Discipline Specific Area/Curriculum based subject /any emerging technology.**

***** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment .Evaluation will be based on the presentation on any latest**

technology/research article in in-house/external seminar/conference and will be conducted by the college committee only.

 # Generic Elective (GE) for other undergraduate programmes

$ NUES (Non – University Examination Subject) Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs out of 100 marks as per evaluation schemes worked out by these societies / organizations at the institution / University level. The coordinators shall be responsible for the evaluation of the same. These activities shall start from the 1st semester and evaluation shall be conducted at the end of 6th semester for the students admitted in the first semester.

Note: Any Elective Subject will be offered if minimum 1/3 rd of the total strength of students in the class will opt for it.

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Course Code: BCA 102 **L T C**
Course Name: Applied Mathematics **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The objectives of this course are to provide the learners with the following:

1. The Knowledge of mathematical probability
2. Understanding of various numerical techniques
3. Familiarity with the Linear Programming and it's applications

PRE-REQUISITES: Basic Concepts of Mathematics

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the various approaches dealing the data using theory of Probability	BTL2	PO1, PO2, PO3, PO4
CO2	Understand various numerical techniques and apply them to solve real life problems	BTL3	PO1, PO2
CO3	Analyse and evaluate the accuracy of common Numerical Methods	BTL4,5	PO1, PO2, PO3, PO4,PO5
CO4	Develop a mathematical model for real life situation and solving it Using Linear programming technique	BTL5	PO1, PO2, PO3, PO4, PO5

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UNIT -I

No. of Hrs. 12 Chapter/Book Reference: TB2 [chapters 3, 4], TB3 [chapters 2, 3, 4, 5, 6]

PROBABILITY: Introduction, Axiomatic definition of Probability, Addition Theorem, Multiplication theorem, Conditional Probability, Baye's Theorem and its applications

PROBABILITY DISTRIBUTIONS: Random Variable, Probability Mass function, Probability density function, Mathematical Expectations of a Random Variable, Binomial Distribution, Poisson distribution, Normal Distribution.

UNIT -II

No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 2, 3], TB3 [chapters 7, 8, 9]

INTERPOLATION: Operators: Shift; Forward Difference, Backward Difference Operators and their Inter-relation, Interpolation Formulae-Newton's Forward, Backward and Divided Difference Formulae: Lagrange's Formula

SOLUTIONS OF NON LINEAR EQUATIONS: Bisection Method, False Position Method, Newton – Raphson

Method for Solving Equation Involving One Variable only.

UNIT -III

No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 5, 6], TB3 [chapters 10, 11]

SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Gaussian Elimination Method with and without Row Interchange: LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method; Gauss – Jordan Method and to find Inverse of a Matrix by this Method.

NUMERICAL DIFFERENTIATION: First and Second Order Derivatives at Tabular and Non-Tabular Points,

NUMERICAL INTEGRATION: Trapezoidal Rule, Simpsons 1/3 Rule: Error in Each Formula (without proof.)

UNIT -IV

No. of Hrs. 12 Chapter/Book Reference: TB4 [Chapters 2, 3, 4, 9, 10]

LINEAR PROGRAMMING: Formulation of linear Programming model, Graphical method of solving linear Programming problem, Simplex Method (Maximization and Minimization)

TRANSPORTATION & ASSIGNMENT PROBLEM: General structure of transportation problem, solution procedure for transportation problem, methods for finding initial solution, test for optimality. Maximization of transportation problem, unbalanced transportation problem, Assignment problem approach of the assignment model, solution methods of assignment problem, maximization in an assignment, unbalanced assignment problem, restriction on assignment

TEXT BOOKS:

TB1. S.S. Sastry, "Numerical Analysis"; Prentice Hall of India, 1998.

TB2. Johnson, R., Miller, I. and Freunds, J., Miller and Freund's "Probability and Statistics for Engineers, Pearson Education (2005) 7th Ed.

TB3. Singh J P "Probability and Numerical Methods" ANE Books, 4th Edition 2019

TB4. Sharma, J.K.; Operations Research: problems & solutions; Macmillan India

REFERENCE BOOKS:

RB1. Grewal B S "Numerical Methods in Engineering and Science" Khanna Publishers, 2012

RB2. Walpole, Ronald E., Myers, Raymond H., Myers, Sharon L. and, Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson Education (2007) 8th Ed.

RB3. Gupta S C, Kapoor V K "Fundamental of Mathematical Statistics" Sultan Chand and Sons 11th edition 2002

RB4. Manmohan, Gupta, P K, Kanti Swarup "Introduction to Management science operations research" Sultan Chand and Sons

Bachelor of Computer Applications

Course Code: BCA 104 **L T C**
Course Name: Web Based Programming **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The objectives of this course are to provide the learners expertise in the following:-

1. Understanding of the syntax and semantics of PHP language
2. Ability to design and develop web applications using PHP as a server side language.
3. Performing CRUD operations in the database

PRE-REQUISITES:

1. Basic knowledge of HTML, CSS and Javascript.
2. Skills to Design static Webpage.

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.	BTL3, BTL4	PO1, PO2, PO3, PO7
CO2	Have a good understanding of Web Application Terminologies	BTL1, BTL2	PO1, PO2, PO3, PO7, PO10
CO3	Learn how to link and publish web sites	BTL1, BTL2	PO1, PO2, PO3, PO4

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UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 1-3, 5]

Introduction to web applications, Client Side Scripting Vs Server Side Scripting, Web Servers : Local Servers and Remote Servers, Installation Process - WAMP, LAMP, XAMPP & MAMP Server, Static website vs Dynamic website development.

Introduction to PHP: Data types, Variables, Super Global Variables, Constants, Comments, Operators and Expressions, Regular Expression, Advantages of PHP

Control statements: Conditional Statement -if else, if elseif else, nested if, switch case, PHP Loops – for, while, do while and foreach loop

Arrays: Indexed Array, Associate Array, Multi-dimensional Array, Array pre-defined Functions

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 7]

Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions, variable scope, Mail function, PHP Errors

Working with Forms: Get and Post Methods, HTML form controls and PHP, State Management: Cookies, Session, Query String, Hidden Field.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 6]

Working With Files: Opening and Closing Files, creating directories and files, Reading and Writing to Files, file inclusion, file uploading and downloading, Getting Information on Files.

Object Oriented Features: Classes and Objects, Building Classes, Access Modifiers, Reusability, Constructors, Destructor.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 8]

PHP Database Connectivity: Using PHP to Access a Database, Relational Databases and SQL, PHP Data Objects, MySQLi Object Interface, SQLite, MongoDB

Introduction to MYSQL, Creating database and other operations on database, Querying a MySQL database with PHP database, connecting to a database, Parsing of the query results, Checking data errors.

TEXT BOOKS:

TB1. Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe. Peter Macintyre, Rasmus Lerdorf, O'Reilly, Third Edition

REFERENCE BOOKS:

RB1. Professional PHP Programming,Jesus Castagnetto,Harish Rawat, Sascha Schumann,Chris Scollo,Deepak Veliath - Wrox Publications

RB2. PHP 5 Advanced, Larry Ullman, Peachpit Press

RB3. Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469).

RB4. Beginning PHP5 and MySQL: From Novice to Professional, W. Jason Gilmore, 2004,Apress, ISBN: 1-893115-51-8

Bachelor of Computer Applications

Course Code: BCA 106 **L T C**
Course Name: Data Structure and Algorithm Using C **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be provided expertise in

1. Understanding of the basic concepts of data structures and their operations like, insertion, deletion, searching and sorting
2. Design algorithms and pseudo codes of various linear and non-linear data structures

PRE-REQUISITES:

1. C Programming Skills
2. Discrete Mathematics

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Familiarize the basics of data structures and algorithms.	BTL2	PO1, PO2, PO3, PO4
CO2	Understand and apply linear and nonlinear data structures and their operations.	BTL3	PO1, PO2, PO3, PO4, PO5
CO3	Compare and implement searching, sorting and hashing techniques.	BTL5	PO1, PO2, PO3, PO4,PO5
CO4	Appraise and determine the correct data structure for any given real world problem.	BTL5	PO1, PO2, PO3, PO4, PO5

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UNIT – I

No. of Hours: 14 Chapter / Book Reference: TB1 [Chapters 1, 4, 9], TB2 [Chapters 1, 6, 7], TB3 [Chapters 1, 2,6,10]

Linear Data Structures- Static: Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.

Arrays: Single Dimension, Two-Dimension and Introduction to Multi Dimensions, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.

Searching and Sorting: Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.

Hashing: Hash Table, Hash Functions, and Collision Resolution.

UNIT – II

No. of Hours: 10 Chapter / Book Reference: TB1 [Chapter 5], TB2 [Chapter 4], TB3 [Chapter 3]

Linear Data Structures- Dynamic

Introduction: Dynamic Memory Allocation**,** Dynamic Memory versus Static Memory Allocation.

Linked List Types: Singly Linked List, Doubly Linked List, Header Linked List, Circular Linked List**.**

Operations: Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.

UNIT – III

No. of Hours: 09 Chapter / Book Reference: TB1 [Chapter 6], TB2 [Chapters 2, 4], TB3 [Chapters 4, 5]

Abstract Data Types:
Stacks: Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.

Queues: Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue, Priority Queue.

UNIT – IV

No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters 7, 8], TB2 [Chapters 5, 8], TB3 [Chapters 7, 8]
Non Linear Data Structures:
Introduction to Graphs: Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.
Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations
Introduction and Creation (Excluding Implementation): AVL Tree, Heap Tree, M- Way Tree, and B Tree.

TEXT BOOKS:

TB1. Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.

TB2. Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson Education India, Second Edition, 2015.
TB3. D. Samanta, "Classic Data Structures", PHI, Second Edition, 2009.

REFERENCE BOOKS:

RB1. Ashok N kamthane "Introduction to Data Structures in C", Pearson**,** Third Edition, 2009.
RB2. E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press, Second edition, 2008.
RB3. D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information-USA, First edition, 2018.
RB4. Y. Kanetkar " Data Structures through C", BPB Publication, Third Edition, 2019.
RB5. R.F Gilberg, and B A Frouzan- "Data Structures: A Pseudocode Approach with C", Thomson Learning, Second Edition, 2004.
RB6. A. K. Rath, and A.K. Jagadev, "Data Structures and Program Design Using C", Scitech Publications, Second Edition, 2011.

Bachelor of Computer Applications

Course Code: BCA 108 **L T C**
Course Name: Database Management System **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The paper aims to introduce the concept of Back end, data storage in computers, design of a DBMS, Queries to construct database, store and retrieve data from the database. The objective of this course is to provide the learners expertise in the following:

1. Understanding of the requirement of database management System for storing data and its advantages over file management system.
2. Designing the database conceptually, physically and finally implementing the creation of database for any application.
3. Learning of queries in SQL for creating database and performing various operations for manipulating data in the database.
4. Knowledge of database utilities i.e. backup, recovery, transaction processing.

PREREQUISITE: Basic knowledge of data storage and file management system

COURSE OUTCOMES (COS):

After completion of this course, the learners will be able to: -

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CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the DBMS concepts with detailed architecture, characteristics.Describe different database languages and environment and learn various data models, along with the related terminologies	BTL1	PO1, PO2, PO3, PO7
CO2	Explore Structure Query Language, a brief on NOSQL, Query By Example.Also understand the overview of SQL, and try to implement DDL, DML and DCL along with operators, use of joins, nested query, use of views and Indexes Discuss Integrity Constraints	BTL3	PO1, PO2, PO3, PO7
CO3	Describe Relational Data Model, explain Codd's Rules, Relational Algebra, Set theory operations and the concept of functional dependencies and normalization	BTL4	PO1, PO2, PO3, PO4
CO4	Acquire Knowledge about Transaction Processing, concurrency problems, and its controlling techniques, Database backup and recovery and security.	BTL2	PO2, PO3, PO4, PO7, PO8

UNIT-I

[No. of Hrs.: 10] Chapter/Book Reference: TB1 [Chapter 2]; TB2 [Chapter 1]

Introduction: An overview of database management system, Characteristics of database approach, DBMS architecture, client/server, data Models, Introduction to Distributed Data processing, schema and instances, data independence,

Data Modelling using Entity Relationship Model: Basic introduction about the terminologies like Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Types of attributes (composite, derived and multivalued attributes) and keys (Super Key, candidate key, primary key), relationships, relation types, weak entities, enhanced E-R, specialization and generalization.

UNIT – II

[No. of Hrs.: 13] Chapter/Book Reference: TB1 [Chapter 8]; TB2 [Chapter 2];

Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.

Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.

Logical operators: BETWEEN, IN, AND, OR and NOT

Null Values: Disallowing Null Values, Comparisons Using Null Values

Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key

Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses,

Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins.

Overview of other SQL Objects: Views, Sequences, Indexes, Triggers and stored procedure.

UNIT – III

[No. of Hrs.: 12] Chapter/Book Reference: TB1 [Chapter 7 & 15]; TB2 [Chapter 3];

Relational Data Models: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, relational DB schema. Codd's Rules
Relational algebra: Basic operations selection and projection,
Set Theoretic operations: Union, Intersection, set difference and division (Order, Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers)
Join operations: Inner, Outer, Left outer, Right outer, and full outer join
ER to relational mapping: Steps to map ER diagram to relational schema
Data Normalization: Functional dependencies, Armstrong's inference rule, & Normalization (Upto BCNF)

UNIT – IV

[No. of Hrs.: 9] Chapter/Book Reference: TB1 [Chapter 19 & 20]; TB2 [Chapter 5];

Transaction Processing: Definition of Transaction, Desirable ACID properties
Database recovery and Database Security: System failure, Backup & recovery Techniques, Authentication, Authorization.
Overview of Query by Language, NoSql databses

TEXT BOOKS:

TB1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.
TB2. Singh S.K., "Database System Concepts, design and application", Pearson Education [TB3]
TB3. Ramakrishnan and Gherke, "Database Management Systems", TMH.
TB4. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991.

REFERENCE BOOKS:

RB1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.
RB2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
RB3. A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.

Bachelor of Computer Applications

Course Code: BCA 110 **L T C**
Course Name: Environmental Studies **2 0 2**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:

1. Development of critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.
2. Acquisition of values and attitudes towards understanding complex environmental economic- social challenges, and active participation in solving current environmental problems and preventing the future ones.
3. Encouraging adoption of sustainability as a practice in life, society, and industry.

PRE-REQUISITES: Basic awareness about the natural environment.

COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:

CO#	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Gain in-depth knowledge on natural processes and resources that sustain life and govern economy.	BTL1,2	PO10
CO2	Understand the consequences of human actions on the web of life, global economy, and quality of human life.	BTL3	PO10
CO3	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.	BTL3	PO10
CO4	Acquire values and attitudes towards understanding complex environmental economic-social challenges, and active participation in solving current environmental problems and preventing the future ones.	BTL4	PO10
CO5	Adopt sustainability as a practice in life, society, and industry.	BTL5	PO10

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UNIT–I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 1, 6]; TB2 [Chapters 8, 11, 25]; TB3 [Chapters 1, 35]

Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies; components of environment: atmosphere, hydrosphere, lithosphere, and biosphere.
- Scope and importance; Concept of sustainability and sustainable development
- Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.
- International agreements and programmer: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity(CBD), Ramsar convention, The Chemical Weapons Convention (CWC), UNEP, CITES, etc

UNIT–II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 2, 3]; TB2 [Chapters 2, 15, 16, 17]; TB3 [Chapters 2, 7, 11, 12]

Ecosystems and Natural Resources

- Definition and concept of Ecosystem
- Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis.
- Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India
- Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration
- Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Agro-residues as a biomass energy source

UNIT–III

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 4]; TB2 [Chapters 4, 5, 6]; TB3 [Chapters 22, 23, 24]

Biodiversity and Conservation

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves.
- Case studies: Contemporary Indian wildlife and biodiversity issues, movements, and projects (e.g., Project Tiger, Project Elephant, Vulture breeding program, Project Great Indian Bustard, Crocodile conservation project, Silent Valley movement, Save Western Ghats movement, etc)

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UNIT–IV

No. of Hours: 9 + 5 for field visit Chapter/Book Reference: TB1 [Chapter 5]; TB2 [Chapters 7, 20, 21, 23]; TB3 [Chapters 25, 26, 27, 28, 30, 31]

Environmental Pollution and Control Measures

- Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards
- Nuclear hazards and human health risks
- Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal
- Environmental Impact Assessment and Environmental Management System
- **Field work/ Practicals (any one)**
- Field visit to any of the ecosystems found in Delhi like Delhi Ridge/ Sanjay lake/Yamuna river and its floodplains etc., or any nearby lake or pond, explaining the theoretical aspects taught in the class room
- Visit to any biodiversity park/ reserve forest/ protected area/ zoo/ nursery/ natural history museum in and around Delhi, such as Okhla bird sanctuary/ Asola Bhatti Wildlife Sanctuary/ Yamuna Biodiversity Park/ Sultanpur National Park, explaining the theoretical aspects taught in the classroom
- Visit to a local polluted site (urban/rural/industrial/agricultural), wastewater treatment plants, or landfill sites, etc

TEXT BOOKS:

TB1. Sanjay Kumar Batra , Kanchan Batra ,Harpreet Kaur; Environmental Studies; Taxmann's, Fifth Edition.
TB2. M.M. Sulphey; Introduction to Environment Management; PHI Learning, 2019
TB3. S.P. Mishra, S.N. Pandey; Essential Environmental Studies; Ane Books Pvt. Ltd. ; Sixth Edition.

REFERENCE BOOKS:

RB1. Asthana, D. K. (2006).Text Book of Environmental Studies. S. Chand Publishing.
RB2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
RB3. Bharucha, E. (2013). Textbook of Environmental Studies for Undergraduate Courses. Universities Press.
RB4. Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). Environment Reader for Universities, Centre for Science and Environment, New Delhi.
RB5. Masters, G. M., & Ela, W. P. (1991).Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
RB6. Odum, E. P., Odum, H. T., & Andrews, J. (1971).Fundamentals of ecology. Philadelphia: Saunders.
RB7. Sharma, P. D., & Sharma, P. D. (2005).Ecology and environment. Rastogi Publications

Bachelor of Computer Applications

Course Code: BCA 134 **L T/P C**
Course Name: Front End Design Tools VB.NET **0 4 2**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

PRE-REQUISITES: Prior knowledge of programming language is beneficial but not mandatory.
COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Design Console application using basic programming concepts.	BT3	PO3, PO5
CO2	Design Windows application using control.	BT3	PO3,PO5
CO3	Understand and use of different Data Structures, Exception Handling	BT2	PO3,PO5
CO4	Learn basic concepts of OOPS. Design classes and interfaces.	BT2	PO3, PO5

SYLLABUS

UNIT I

Introduction to Visual Basic .Net Framework - .Net Architecture, Features of .Net, Advantages of .Net, .Net Framework, CLR, CTS, CLS, Assemblies, Memory management issues – Garbage Collector and collection process.

Introduction to Visual Basic.Net IDE: Creating a project, Types of project in .Net, Exploring and coding a project, Solution explorer, toolbox, properties window, Output window, Object Browser.

Programming Basics: Variable, Data Types, Conditional Constructs, Loop Statements, Creating Console Application.

UNIT II

Introduction to GUI Environment and understand the working of commonly used controls - their properties, methods and events.

UNIT III

Introduction to Data Structures: Array, ArrayList, Structure and Enumeration.

Introduction of Exception handling - structured and unstructured.

UNIT IV

Procedure and function. Introduction to Object Oriented Programming : OOPS Concepts, Creation

of Class, Interface and Namespace.

List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO #**
Core Practicals (Implement minimum 10 out of 15 practicals)		
1.	Create console application showing the use of conditional constructs - if, if-else, if-elseif-else, nested if, select case.	CO1
2.	Create console application showing the use of loops –Do While..Loop, Do Until … Loop, While... Wend, For … Next, For Each … Next.	CO1
3.	Create a simple windows application showing the use of TextBox, Button, Label Controls, Radio Button, Check Box, Combo Box and List Box Controls.	CO2
4.	Create a windows application showing the use of Image, Timer, Panel, Scroll bar, Status Bar Controls.	CO2
5.	Create an MDI application showing the use of multiple forms, toolbar, menu, status bar, RichText Box, Dialog Controls.	CO2
6.	Create console/windows application to showing the use of Structured Exception handling- try..end try, catch, finally.	CO3
7.	Create console/windows application to showing the use of Unstructured Exception handling- On Error, Resume Next etc.	CO3
8.	Create console/windows application showing the use of Array class - its methods and properties.	CO3
9.	Create console/windows application showing the use of Array List - its methods and properties.	CO3
10.	Create console/windows application showing the use of Enumeration, Constants and Structures.	CO3
11.	Create console/windows application showing the declaration and use of user defined functions.	CO3
12.	Create console/windows application showing the use of different argument passing mechanism – ByVal, ByRef, Optional and Paramarray.	CO3
13.	Create console/windows application showing the declaration and use of Class with Data members, Function Member, Constructor Member, Destructor Member, Event Member, Property Member, Shared Member, Type Member.	CO4
14.	Create console/windows application showing the implementation of Inheritance.	CO4

15.	Create console/windows application showing the use of Polymorphism.	CO4
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
16.	Write a Program to find diameter, circumference and area of circle using procedure.	CO1
17.	Write a Program to find maximum between three numbers using select case and if--else.	CO1
18.	Create Basic calculator with all the functionalities.	CO2
19.	Create a basic Digital or Analog Clock using Timer, Image, Button, ComboBox and other relevant controls.	CO2
20.	Write a Program to find second largest element and second smallest element in an array.	CO3
21.	Write a program to create an arraylist of 10 elements. Create a procedure to add new element at the specific location in the arraylist and display the updated arraylist.	CO3
22.	Write a program to validate the username and password entered by user and create userdefined exception to prompt message on three consecutive wrong password entries.	CO3
23.	Create a Class Box with following private data members length, breadth, height and function getVolume, and public member functions input and output. Create an object of class and call appropriate functions.	CO4
24.	Create a class Rectangle, with protected members width and height, public procedure setWidth and setHeight, getArea. Inherit it in another Class ShrinkRectangle with a data member shrink factor. Create object of the class and call appropriate member functions. Create appropriate class to demonstrate overloading of function 'area' for finding area of a circle, square, rectangle and a triangle.	CO4
25.	Create a class Book with data members: BookId, BookName, Cost, Pages. Member property to add data to all its data members, function to find cost per page. Create five objects of 5 books and find total cost.	CO4

Note:

1. **In total 15 practicals to be implemented.**
2. **Two additional practical may be given by the course instructor.**
3. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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Course Code: BCA 136 L T C

Course Name: Statistical Analysis using Excel 0 4 2

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to apply the concepts pertaining to the following:-

1. The understanding of the basic concepts of statistics
2. Using Excel for applying the Statistical concepts in day to day operations

PRE-REQUISITES:

1. The student must be adequate knowledge of working in MS Excel
2. The student must be well versed in the basic concepts of Statistics

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the basic concepts of statistics and its application in the real life scenarios	BTL2	PO1, PO2, PO3
CO2	Understand the means and mechanisms for applying the various skills used in the process of generating various statistical concepts by using MS Excel software	BTL3	PO1, PO2, PO3, PO5, PO8
CO3	Developing the skills needed for understand the various features of MS Excel software which assist the user in the process of deriving statistical measures	BTL3	PO1, PO2, PO3, PO4, PO5, PO7
CO4	Understand the skill needed to draw various forms of graphical representation based on statistical data	BTL4	PO2, PO3, PO4, PO6
CO5	Understand the various features of MS Excel involved in the process of compilation and summarizing of Statistical data and the skills needed to interpret the statistical data	BTL5	PO2, PO3, PO4, PO5, PO6, PO7, PO8
CO6	Understand the skills needed to ensure the process of integrating data from multiple in MS Excel	BTL6	PO2, PO3, PO5, PO6, PO7, PO8

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UNIT – I

Chapter/Book Reference: TB1 [Chapters 1, 2]; TB2 [Chapters 1, 3];

Introduction to Statistics: Defining statistics, Importance of Statistics, application of statistics in real life scenarios. The skills and characteristics needed to deal with the data. The importance of IT tools in the usage of statistical data. MS Excel as the IT tool for dealing with statistical data. Features of MS Excel

UNIT – II

Chapter/Book Reference: TB1 [Chapter 6]; TB2 [Chapter 7]

Introduction to MS Excel. Basic structure of MS Excel. Cells, range, Tabs and the importance of formulae in MS Excel for dealing with statistical data. Introduction to Data analysis tab and the various statistical features available in data analysis tab. Installing Data analysis tab. using statistical functions of MS Excel for data analysis

UNIT – III

Chapter/Book Reference: TB1 [Chapter 7]; TB2 [Chapter 9]

The application of Measures of central tendency by using MS Excel. Frequency distribution, Graphical representation of data along with formatting features of various graphs. Measures of Central Tendency with its illustration in MS Excel

UNIT – IV

Chapter/Book Reference: TB1 [Chapter 8]; TB2 [Chapter 11]

The measures of Dispersion by using MS Excel. The consolidation of data by using Pivot table, The Data table, Scenarios and Goal seek functions by using data to predict future scenarios. The illustration of cro-relation and regression in predicting

TEXT BOOKS:

TB1. Understanding Educational Statistics Using Microsoft Excel and SPSS. Edition No. 1, Martin Lee Abbott, John Wiley and Sons. Ltd, 2011

TB2. Statistics For Management Using Microsoft Excel, Ash Narain Sah, John Wiley, 2018

REFERENCE BOOKS:

RB1. Statistics with Microsoft Excel by Dretzke, Beverly Jean, Prentice Hall, 2019

RB2. Applied Statistics with Microsoft Excel, Gral Keller, Cengage, 2015

List of Practical		
S. No.	**Detailed Statement**	**Mapping to CO #**
1.	Enter the marks of 20 students in the given order • Serial number • Name of the student • Name of the college • Class • Subject-1 • Subject -2 • Subject -3 • Subject -4 In a separate columns, perform the following operations	CO1

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Calculate the following

a. Total marks of all the subjects
b. Percentage of marks for each of the students
c. Allotment of grades based on the criterion.
    - If the marks are more than 75% then the result is "Pass" else "Fail"
d. Now in other column allot the grades based on the following criterion
    - If the marks are more than 90% then grade is "A"
    - If the marks are more than or equal to 75 and less than 90% then the grade is "B" else the grade if "C" provided that the result is "Pass"

2. From the following table, calculate the following — CO2

City	Number of Schools	Number of candid
New Delhi	300	30000
Mumbai	450	45000
Bengaluru	500	48000
Chennai	480	67000
Trivandrum	459	77000

- The average number of students in the entire distribution
- The standard deviation of the distribution
- The correlation coefficient between the number of schools and the number of candidates
- The regression equation between number of students and number of candidates

3. From the following data calculate the — CO4, CO5

Base City	**Department**	**Client**	**Location**	**Nation**
New Delhi	Marketing	Adidas	New York	American
Mumbai	Advertising	Hilfiger	London	English
Bengaluru	Human Resource	Woodland	Paris	Spanish
Chennai	Human Resource	Nike	Sydney	Dutch
Trivandrum	Advertising	Allen Solley	Frankfurt	Japanese
New Delhi	Quality Control	Adidas	New York	American
Mumbai	Advertising	Hilfiger	Seoul	Korean
Bengaluru	Human Resource	Woodland	Paris	Spanish
Chennai	Human Resource	Nike	Sydney	Dutch

	Trivandrum	Advertising	Armani	Frankfurt	Russian	
	New Delhi	Marketing	Adidas	New York	American	
	Mumbai	Production	Hilfiger	Copenhagen	English	
	Bengaluru	Human Resource	Woodland	Paris	Spanish	
	Chennai	Human Resource	Nike	Sydney	Russian	
	Trivandrum	Advertising	Gucci	Frankfurt	Japanese	
	New Delhi	Quality Control	Adidas	New York	American	
	Mumbai	Advertising	Hilfiger	London	Korean	
	Bengaluru	Human Resource	Woodland	Paris	Spanish	
	Chennai	Human Resource	Nike	Sydney	Dutch	
	Trivandrum	Advertising	Allen Solley	Frankfurt	Japanese	

Using Pivot table, determine

- The number of Nationality per Location
- The number of Department / location / client
- The number of client / location / nationality

4. A finance company wants to publish the following table — CO5

Qty ↓ / Price →	**10**	**20**	**30**	
25	**250**	**500**	**750**	
35	**350**	**700**	**1050**	
45	**450**	**900**	**1350**	
55	**550**	**1100**	**1650**	
65	**650**	**1300**	**1950**	

Using Data table, prepare the above tabular distribution

5 Using the Goal seek function of Excel, prepare the following table for calculating the amount based on the simple interest formula. — CO1

Principle Amount	
Rate	
Time	
Amount	

	Simulate the amount by differing values of • Principle amount • Rate • Time	

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Course Code: BCA 138 **L T/P C**
Course Name: Designing Lab Photoshop **0 4 2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:

1. Knowledge of Tools in Photoshop.
2. Exporting images & pdf.
3. Uses of gif & digital enhancement in images.

PRE-REQUISITES:

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Explain the basics of graphics designing & Adobe suite	BTL1	PO6, PO11, PO14, PO20
CO2	Exploring the Raster designing tools in Adobe Photoshop.	BTL3 BTL5	PO1, PO2, PO3, PO4, PO5, PO8, PO11-PO20
CO3	Exploring the Vector designing tools in Adobe Photoshop.	BTL3 BTL5	PO6, PO7, PO9, PO13, PO11-PO20
CO4	Exploring the image filters & adjustments in Adobe Photoshop.	BTL3 BTL5	PO10, PO11-PO20

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UNIT – I

No. of Hours: 11

Introduction to graphic designing, Input/Output Technologies, Color Coding: RGB, CMYK, Grayscale, Bitmap, Color Channel, Resolution, Printing Templates, Raster Images, Vector Images, Measurement Units & Conversion, Introduction to Adobe suite & Photoshop.

UNIT – II

No. of Hours: 11

Introduction to Layers, Groups & Smart Objects, Color Picker, Selection Tools & Marquee Tool, Crop Tool, Brush Tool, Clone & Patch Tools, Eraser Tools, Coloring Tools, Text Tools, Hand & Zoom Tools, Background & Foreground Colors, Image Mask, Alignment Controls, Transform Controls, Importing Images in Photoshop.

UNIT – III

No. of Hours: 11

Introduction to Shapes & Shape Tools, Path & Direct Selection Tools, Pen Tool, Image Editing Tools, Layers Style, Filters, Blend Modes, Image Adjustment Options, Window Menu Options, Layer Mask.

UNIT – IV

No. of Hours: 11

Introduction to Photoshop Filter: Blur, Distort, Noise, Render, Sharpen, Stylize, Exporting Images & PDF, Introduction to GIF & Timeline Window, Importing/Exporting CorelDraw Files from Photoshop.

TEXT BOOKS:

TB1. Faulkner Andrew (Author), Chavez Conrad (Author), "Adobe Photoshop CC Classroom in a Book" Adobe Press.
TB2. DT Editorial Services, "Photoshop CC in Simple Steps" Dream Tech. Press.

REFERENCE BOOKS:

RB1. Lisa DaNae Dayley, Brad Dayley, "Photoshop Bible", John Wiley & Sons, Inc.
RB2. Glyn Dewis, "The Photoshop Workbook: Professional Retouching and Compositing Tips, Tricks, and Techniques", Peachpit Press.
RB3. Peter Bauer, "Adobe Photoshop CC For Dummies", John Wiley & Sons, Inc.

List of Practicals

S. No.	Detailed Statement	Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Create a file to demonstrate the use of layers, groups & smart objects.	CO2
2.	Create a photo frame in Photoshop.	CO2
3.	Take an image of basic shape (square, triangle, circle, rectangle and parallelogram) in Photoshop & extract these shapes from the image to	CO2

	different layers using marquee tools.	
4.	Create a custom brush preset in Photoshop.	CO2
5.	Create a custom pattern preset in Photoshop.	CO2
6.	Create a visiting card for yourself in Photoshop. (size=3.5 x 2 inch., color coding: CMYK)	CO1, CO3,
7.	Create a file having two images (rename the layer as foreground & background image) in two different layers. Blur the background image & place the foreground image over the background image in a way both layers are visible.	CO3,
8.	Create a border design using a brush tool.	CO2
9.	Create basic shapes (square, triangle, circle, rectangle and parallelogram) in Photoshop on a single layer using the shape tools.	CO3,
10.	Create a simple GIF in Photoshop.	CO4
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
11.	Create a digital invitation card in Photoshop and export it in PDF Format. Use the Photograph (Practical 7) or GIF (Practical 10) and border (Practical 8) along with other features of Photoshop as per your requirements. (size=A8 or A4, color coding: RGB)	CO1, CO2, CO3, CO4
12.	Create a custom Desktop background in Photoshop.	CO2, CO3, CO4
13.	Create a water drop and heart shape in Photoshop using the shapes tools or Pen Tool.	CO3
14.	Create a “Save Water” Poster from the shapes created in Practical 13. (size=A8 or A4, color coding: CMYK)	CO1, CO2, CO3, CO4
15.	Perform Digital Makeup on the Photograph of some celebrity in Photoshop.	CO2, CO3, CO4
16.	Create a cartoon character in Photoshop using the Shape and Pen Tools.	CO2, CO3, CO4
17.	Create a chocolate bar with the brand name in Photoshop. The individual cube of the chocolate must have a 3D Visual Effect.	CO2, CO3, CO4
18.	Create your company logo in Photoshop.	CO2, CO3, CO4
19.	Create a magazine Cover in Photoshop.	CO2, CO3, CO4
20.	Create a Thanks Giving card & export it in Pdf (size=A8 or A4, color coding: RGB)	CO1, CO2, CO3, CO4
Note: **1. In total 15 practicals to be implemented. 2 additional practical may be given by the course**		

instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Bachelor of Computer Applications

Course Code: BCA 172 **L T/P C**
Course Name: Practical-IV WBP Lab **0 4 2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Understand the syntax and semantics of PHP language
2. Design and develop web applications using PHP as a server side language
3. Perform database connectivity using MYSQL as database server.

PRE-REQUISITES:

1. Knowledge of HTML, CSS, Javascript, bootstrap and XML.
2. Able to Design Static Website.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.	BTL3	PO1, PO2, PO3,PO7
CO2	Have a good understanding of Web Application Terminologies	BTL1, BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Learn how to link and publish web sites	BTL1, BTL2	PO1, PO2, PO3,PO4

List of Practicals

S. No.	Detailed Statement	Mapping to CO #
	Core Practicals	
1.	Write regular expressions including modifiers, operators, and metacharacters.	CO1, CO2
2.	Write a program to show the usage of nested if statement.	CO1, CO2
3.	Write a Program in PHP for type Casting Of a Variables	CO1, CO2
4.	Write a program to create a menu driven program and show the usage of switch-case.	CO1, CO2
5.	Write a program to show the usage of for/while/do while loop	CO1, CO2
6.	Write a program to perform all four types of sorting	CO1, CO2
7.	Write a program to implement Array-pad(),aaray_slice(),array_splice(),list() functions.(use foreach wherever applicable)	CO1, CO2
8.	Write a program to show the application of user defined functions.	CO1, CO2
9.	Write a program that Passes control to another page (include, require, exit and die functions)	CO1, CO2
10.	Write a program to validate the form data using Filter_var() function.	CO1, CO2
11.	Write a program to show the usage of Cookie.	CO1, CO2
12.	Write a program to show the usage of Session	CO1, CO2
13.	Write a program to implement oops concepts.	CO1, CO2
14.	Do Form handling In PHP Design a personal Information form , then Submit & Retrieve the Form Data Using $_GET(), $_POST() and $_REQUEST() Variables	CO1, CO2
15.	Design A Login Form and Validate that Form using PHP Programming	CO1, CO2
16.	Create Admin Login ,Logout form using session variables	CO1, CO2
17.	Write a program to create a file.	CO1, CO2

18.	Write a program that use various PHP library functions, and that manipulate files and directories.	CO1, CO2
19.	Write a program to read and display the content of previously created file.	CO1, CO2
20.	Write a program to modify the content of an existing file.	CO1, CO2
21.	Create a web page and which provides File uploading and downloading a file.	CO1, CO2
22.	Design a from which upload And Display Image in PHP	CO1, CO2
23.	Use phpMyAdmin and perform the following: import, review data and structure, run SQL statements, create users and privileges	CO1, CO2
24.	Write a program to create a mysql database.	CO1, CO2
25.	Write a program to create a table and insert few records into it using form.	CO1, CO2
26.	Write a program to select all the records and display it in table.	CO1, CO2
27.	Write a program to modify (delete/modify/add) a table.	CO1, CO2
28.	Write a PHP script, to check whether the page is called from 'https' or 'http'.	CO1, CO2
Application Based Practical		
29.	Write a program to verify text data as per the pattern.	CO3
30.	Create a dynamic website by incorporating the following functionalities: • Implement a basic registration and login system, with styling, • Make the database connection • Make a connection to a MySQL database, and log in with valid credentials. • Create Dynamic, interactive and database - Driven web application using php & mysql • Perform some validation check. If any of these operations cause an error, stop execution and print the error message. The script should respond differently depending on the situation. Add a “Log Out” button to logout from the system	CO3

Note:
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

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Course Code: BCA 174 **L T/P C**
Course Name: Practical-V DS Lab **0 4 2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Implement various types of data structures using C
2. Implement different operations on linear and non-linear data structures

PRE-REQUISITES:
C Programming Skills

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Implement basic operations on static linear data structures.	BTL3	PO1, PO2,PO3, PO4
CO2	Implement various operations on dynamic linear data structures.	BTL6	PO1, PO2,PO3, PO4,PO5
CO3	Implement basic operations on non-linear data structures	BTL3	PO1, PO2,PO3, PO4, PO5
CO4	Implement searching techniques on linear and non-linear data structures.	BTL4	PO1, PO2,PO3, PO4
CO5	Implement sorting techniques on one dimensional array.	BTL4	PO1, PO2,PO3, PO4

List of Practical

S. No.	Detailed Statement	Mapping to CO #
	Core Practicals (Implement minimum 8 out of 10 practicals)	
1.	WAP to implement following operation on one dimensional array (i) Insertion (ii) Deletion (iii) Traversal (iv) Reverse (v) Merge	CO1
2.	WAP to Sort an array using menu driven: (i) BUBBLE SORT (ii) MERGE SORT(iii) INSERTION SORT (iv) SELECTION SORT	CO1, CO5
3.	WAP to implement a Singly Linked List.	CO2
4.	WAP to implement a Circular Linked Lists	CO2
5.	WAP to implement Doubly Linked Lists	CO2
6.	Write a menu driven program to implement (i) Static Stack (ii) Dynamic Stack.	CO1, CO2
7.	WAP to implement a (i) Static (ii) Dynamic Circular Queue	CO1, CO2
8.	WAP to implement a (i) Static (ii) Dynamic De-Queue.	CO1, CO2
9.	Implement recursive algorithms for the following operations on Binary Search Tree a) Insertion b) Searching	CO1, CO2, CO3, CO4
10.	Implement recursive algorithms for BST traversal- Inorder, Preorder, Postorder.	CO2, CO3

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Application Based Practical (Implement minimum 5 out of 10 practical)		
11.	WAP to search & display the location of an element specified by the user, in an array using (i) Linear Search (ii) Binary Search technique.	CO1, CO4
12.	WAP to accept a matrix from user, find out matrix is sparse or not and convert into triplex matrix.	CO1
13.	WAP to implement Polynomial addition operation using linked list.	CO2
14.	Write a C program to create two linked lists from a given list in following way INPUT List:- 1 2 3 4 5 6 7 8 9 10 OUTPUT:- First List:- 1 3 5 7 9 Second List:- 2 4 6 8 10	CO2
15.	WAP to implement Student Database using Linked List with the following structure • Name • Rollno • Marks of 5 subjects • Average • Result, If the average < 50, then print 'Fail', otherwise 'Pass'	CO2
16.	Write a program to convert Infix to equivalent (i) Prefix expression (ii) Postfix expression	CO1
17.	Write a program to evaluate (i) Prefix Expression (ii) Postfix Expression using stack.	CO1
18.	Let us assume a Patient's coupon generator for the Doctors' clinic. The patients are given the coupons on first-come-first-serve basis. After the visit of a patient, patient-ID is kept stack-wise. At the end of the day, the count is generated from the stack. Construct a menu-based program for patients' coupons generator using an appropriate data structure.	CO1, CO2
19.	WAP to implement an expression tree. (For example: (a + b / (c * d) – e))	CO3
20.	Sometimes a program requires two stacks containing the same type of items. Suppose two stacks are stored in separate arrays, then one stack might overflow while there is considerable unused space in the other. A neat way to avoid this problem is to put all spaces in one stack and let this stack grow from one end of the array, and the other stack starts from the other end and grows in the opposite direction, i.e., toward the first stack. In this way, if one stack turns out to be large and the other small, then they will still both fit, and there will be no overflow until all space is used. Declare a new structure that includes these two stacks and perform various stack operations.	CO1

Note:
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

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Course Code: BCA 176 **L T/P C**
Course Name: Practical-VI DBMS Lab **0 4 2**

LEARNING OBJECTIVES:

The course is to provide the basics of SQL. To understand RDBMS and construct queries using SQL to design a database and manipulate data in it.

PRE-REQUISITES: NIL

COURSE OUTCOMES:
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the structure and design of relational databases.	BT2	PO3
CO2	Write DDL statements in SQL to create, Modify and remove database objects	BTL1, BTL3, BTL4	PO3, PO5
CO3	Use constraints for the database	BTL1, BTL2, BTL3	PO3,PO5
CO4	Write DML statements in SQL to insert, Modify and remove data from database	BTL4	PO3,PO5
CO5	Write SQL statements to retrieve data based on the conditions provided by the user	BTL1, BTL2, BTL3	PO3,PO5
CO6	Use index and Views in database	BTL2	PO3,PO5
CO7	Use structured query language (SQL) to an intermediate/advanced level	BTL5, BTL6	PO4

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List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO #**
Core Practicals (Implement All the mentioned practicals)		
The following are two suggestive databases. The students may use any one or both databases for their core practicals. However, the instructor may provide any other databases for executing these practical. **1. COLLEGE DATABASE**: STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec) CLASS (USN, SSID) SUBJECT (Subcode, Title, Sem, Credits) IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) **2.COMPANY DATABASE:** EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours)		
1	Draw an E-R diagram from given entities and their attributes	CO1
2	Convert the E-R diagram into a Relational model with proper constraints.	CO1
3	Write queries to execute following DDL commands : CREATE :Create the structure of a table with at least five columns ALTER:Change the size of a particular column. Add a new column to the existing table. Remove a column from the table. DROP: Destroy the table along with its data.	CO2
4	Write queries to execute following DML commands : INSERT: Insert five records in each table. UPDATE: Modify data in single and multiple columns in a table DELETE: Delete selective and all records from a table	CO4
5	Write queries to execute following DML command : SELECT: Retrieve the entire contents of the table. Retrieve the selective contents (based on provided conditions) from a table. Retrieve contents from a table based on various operators i.e. string operators, logical operators and conditional operators,Boolean operators. Sort the data in ascending and descending order in a table on the basis of one column or more than one column.	CO5
6	Create table using following integrity constraints: Primary Key	CO3

	Unique Key Not Null Check Default Foreign Key	
7	Write queries to execute following Aggregate functions Sum,Avg,Count,Minimum and Maximum value of a numeric column of a table using aggregate function	CO7
8	Retrieve data from a table using alias names .	CO5
9	Retrieve data of a table using nested queries.	CO5
10	Retrieve data from more than one table using inner join, left outer, right outer and full outer joins	CO5
11	Create view from one table and more than one table.	CO6
12	Create index on a column of a table.	CO6
Application Based Practicals		
13	Consider the Insurance company's Database given below. The primary keys are underlined and the data typesare specified. PERSON(driver_id# : string, name : string, address : string) CAR(regno : string, model : string, year : int) ACCIDENT(report_number : int, acc_date : date, location : string) OWNS(driver_id# : string, regno : string) PARTICIPATED(driver_id# : string, regno : string, report_number : int, damage_amount :number(10,2)) (i) Create the above tables by properly specified the primary key and the foreign key (ii) Enter at least five tuples for each relation (iii) Demonstrate how you can a. Update the damage amount for the car with a specific regno, the accident with report number 12 to 25000. b. Add a new accident to the database. (iv) Find the total number of people who owned cars that were involved in accident in2002. (iv) Find the number of accident in which cars belonging to a specific models were involved	CO7
14	Consider the following schema of a library management system.Write the SQL queries for the questions given below; **Student(Stud_no : integer, Stud_name: string)** **Membership(Mem_no: integer, Stud_no: integer)** **Book_(book_no: integer, book_name:string, author: string)**	CO7

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	lss_rec_(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer) (i) Create the tables with the appropriate integrity constraints (ii) Insert around 10 records in each of the tables (iii)Display all records for all tables (iv)List all the student names with their membership numbers (v) List all the issues for the current date with student and Book names (vi) List the details of students who borrowed book whose author is Elmarsi & Navathe (vii) Give a count of how many books have been bought by each student (viii) Give a list of books taken by student with stud_no as 1005 (ix) Delete the List of books details which are issued as of today (x) Create a view which lists out the iss_no, iss _date, stud_name, book name	
15	Use the relations below to write SQL queries to solve the business problems specified. CLIENT (clientno#,name, client_referred_by#) ORDER (orderno#, clientno#, order_date, empid#) ORDER_LINE (orderno#, order line number#, item_number#, no_of_items, item_ cost,shipping_date) ITEM (item_number#, item_type, cost) EMPLOYEE (empid#, emp_type#, deptno, salary, firstname, lastname) Notes: a. Column followed by # is the primary key of the table. b. Each client may be referred by another client. If so, the client number of the referring client is stored in referred_by. c. The total cost for a particular order line = no_of_items * item_cost.c. Write queries for the following (i) Create all the above tables. (ii) Insert at least five records. (iii) Display all the rows and columns in the CLIENT table. Sort by client name in reverse alphabetical order. (iv) Display the item number and total cost for each order line (total cost = no of items X item cost). Name the calculated column TOTAL COST. (v) Display all the client numbers in the ORDER table. Remove duplicates. (vi) Display the order number and client number from the ORDER table. Output the result in the format. Client <clientno> ordered <orderno> (vii) Display full details from the ORDER_LINE table where the item number is (first condition) between 1 and 200 (no > or < operators) OR the item number is greater than1000 AND (second condition) the item cost is not in the list 1000, 2000, 3000 OR the order number is not equal to 1000. (viii) Display the client name and order date for all orders.	CO7

	(ix) Repeat query (6) but also display all clients who have never ordered anything. (x) Display the client name and order date for all orders using the join keywords. (xi) Display the client name and order date for all orders using the JOIN method. (xii) Display the client number, order date and shipping date for all orders where the shipping date is between three and six months after the order date. (xiii) Display the client number and name and the client number and name of the person who referred that client. (xiv) Display the client name in upper case only and in lower case only. (xv) Display the second to fifth characters in each client name.	

Note:
1. In total 15 practicals to be implemented.
2. This is a suggestive list of practicals. However, the instructor may add or change any other database for executing queries as per the requirement.

REFERENCE BOOKS:

RB1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.
RB2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
RB3. A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.